

PROJECT CHARGE: 1706
PROJECT TITLE: TOBACCO PHYSICS
PROJECT LEADER: D. B. Losee
PERIOD COVERED: July 1-31, 1980
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TOBACCO DECOMPOSITION STUDIES (1,2)

EGA-GC data from experiments on J8LC bright tobacco samples in 0-50% O_2 are being analyzed.

CIGARETTE COMBUSTION/PYROLYSIS CONTROL (1,2,3)

EGA-GC combustion (22% O_2) runs have been made on α cellulose, 5% NaCl + α cellulose and $CaCl_2$ + α cellulose. Both salts lowered the total amount of CO generated.

Pyrolytic thermal weight loss data have been collected on washed Marlboro filler and washed Marlboro filler with salts (NaCl, KCl, Na_2CO_3 , $CaCl_2$ and $MgCl_2$) added at the 5% level. Among the added salts Na_2CO_3 addition had the greatest effect on the weight loss seen in the "tar forming" region (increases) as well as in the "char forming" region (decreases). This salt also greatly decreases the temperature of the maximum rate of weight loss in both the "tar forming" region and the "char forming" region. In general, the monovalent chlorides slightly increase the weight loss in the "tar forming" region and decrease the loss in the "char forming" region, while the reverse is true for the divalent chlorides.

With an eye toward statistically significant coal temperatures, data on CO/puff versus coal temperature for pure MF blend components are being analyzed.

An apparatus originally designed for collecting condensate in temperature intervals (fractions) between ambient and 900°C is being redesigned. Problems associated with trapping all of the condensibles have arisen with the original design.

PHYSICAL CHARACTERIZATION OF TOBACCO (2,4,5)

A meeting was held with a Barnes Engineering representative to discuss the feasibility of measuring tobacco particle temperatures in the expansion

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tower.

Tower exit tobacco samples expanded using four different processes and examined as a function of time using both EPR and diffuse reflectance spectroscopy have revealed an increase in the moisture content of the samples over a 30 day period and a plateau in the number of matrix stabilized radicals after approximately 16 days. Equilibrated samples displayed an insignificant variation in the radical content in this same period.

MATHEMATICAL MODEL OF A BURNING CIGARETTE (6,7,8)

The recent installation of an HP plotter in Building 36 by the Computer Application Division and their subsequent support has greatly improved our on-site computing capabilities. Much effort has gone into graphing in standard formats all of the relevant data thus far acquired on the pyrolysis and combustion of bright tobacco with the aim toward assembling a coherent "picture" of the thermal decomposition processes involved.

A computer program has been written which simulates the flow of an aerosol around an array of cylinders using a modified flow field which accounts for the slip of the gas as it flows by the cylinder. Comparison of these results with an alternative approach used in the literature will provide a check on the simulation procedure.

In cooperation with Project 1702 a procedure was developed for determining the size distribution at a number of wavelengths.

The new filtration model for calculating the filtration efficiency of a polydisperse aerosol from the filtration properties of the individual particle sizes was reformulated in more generalized form allowing more freedom in its use.

SPECIAL TOPICS (9,10)

Documentation of output options for workspace and file management in the APL Account 79 modelling system is nearly complete.

Work on the current phase of the Westab modelling project has been completed.

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